

Assay Office, U.S. Mint
May 14. 1879

Hon. A. London Snowden
Superintendent &c. &c.

Sir,

I have to report to you a highly interesting and important revelation in our Mint=metallurgy. Indeed, it must prove not less valuable for the producers and refiners of bullion, and the manufacturers of jewelry and silver ware generally.

From your experience here as Coiner, you were cognizant of occasional embarrassments in that department, arising from the want of toughness, of gold & silver ingots. The same trouble has happened in the London mint, and elsewhere, and the cause was not understood. Lead, arsenic, sulphur, & antimony, in very minute proportions, were charged with it, ^{not always} but ~~with~~ due proof, or ~~any~~ amendment; and quite lately, our present Coiner brought in to us a brittle strip of silver, as a sample of what he had to contend with. My first assistant, Mr Eckfeldt, tried it for lead, (the most likely cause) but found none of any account.

Just a few days ago, a published item fell into the hands of Mr. Outerbridge, one of my assistants, stating a discovery by a French scientist, M. de Bray, in the working of silver, namely:

that a mere trace of selenium, a rare semi-metal, occasionally contained as a ^{compound} ~~salt~~ in sulphuric acid, if carried into silver resulting from sulph. acid partings, would render it hard, blistered, mottled, and apt to break. The statement, as full as we have it, is copied into the report which accompanies this letter.

Mr. Outenbridge proceeded to ascertain if this substance was contained in the fine bars from the U.S. Assay Office at New York. Mr. Eckfeldt also conducted a similar examination. The results were alike, proving the presence of selenium; about one part per thousand.

Here I must remind you, that the manufacturers of gold and silver wares, have long been in the practice of bringing the N.Y. bars to us, which they could not work, doubtless for the reason given by Mr. De Bray; paying the bar charge in order to get our bars instead, which are the product of nitric acid parting.

The remedy for this trouble, is to employ Sulphuric acid known to be free from selenium. I therefore suggest that you bring this important matter to the notice of the Director, and also of the Superintendent at New York.

We are making further experiments synthetically with this mineral, which will be reported to you; but they will not alter the fact already set forth.

Very respectfully
W.E. DuBois
Assayer

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